in which it is so rich, we should still possess in it a collection of scientific information well arranged in rightful sequence, and as a whole of very direct importance to mankind—of so much importance, indeed, that in some degree it should be at the command of the caterer and the cook, as well as of the physician. The present edition has been specially improved in those parts of more immediate importance to the medical practitioner, and this is natural because of the occupation of the author, but is also probably a consequence of the special market which the book has found. It will, however, be well when such a book reaches the wider market for which it is intended, as will no doubt happen when present efforts to provide an adequate training in "domestic science" have gained a deeper and wider success. When that time arrives "hygiene" will have permanently lifted its head above drain-pipes and fevers, and passed even the limits of interest in rickets and in defective vision.

Developing schemes of public health lead us to anticipate a time when the committal to memory of the symptoms of incipient disease will no longer form part of the responsibility of the general public. So much at least we might infer from the manner in which the medical supervision of schools and workshops, and even of homes, is passing into the hands of inspectors and nurses under the control of medical officers of health. Responsibility for the possession of some of the knowledge contained in this book will, however, never pass away from the individual householder, certainly never until the "State" is actually the householder and the "State doctor" the mother of every family in the kingdom.

In certain unimportant particulars patient scrutiny reveals the fact that faults might occasionally be found in this book, but *cui bono?* The book is sound and comprehensive, the author extremely able and entertaining, the present edition an improvement on its forerunners, and the subject of vital interest to the community. Space should be found for it in the library of every educated family as necessarily as in that of every practitioner of medicine. To the latter it is now no longer needful to plead for its welcome.

J. S. MACDONALD.

THE CONSTANTS OF NATURE.

(1) *Tables of Physical and Chemical Constants, and Some Mathematical Functions.* By Dr. G. W. C. Kaye and Prof. T. H. Laby. Pp. vii+153. (London: Longmans, Green and Co., 1911.) Price 4*s.* 6*d.* net.

(2) *Smithsonian Miscellaneous Collections.* Vol. 58, No. 1, Smithsonian Physical Tables. Prepared by F. E. Fowle. Fifth revised edition. Pp. xxxiv+318. (Washington: Smithsonian Institution, 1910.)

THESE two volumes of newly compiled tables of physical and chemical constants cover very much the same ground, though differing greatly in many respects. The larger volume of 318 pages is a revised edition of the famous Smithsonian tables, bearing on the title-page the name of Mr. F. E. Fowle, of the Astrophysical Observatory, as its compiler. It is issued as an official publication of the Smithsonian Institution. The smaller tables of Dr. Kaye and Prof. Laby are the first issue of an entirely new work by private individuals.

In the prefaces to the larger book, by Dr. Wolcott and Mr. Fowle, it is stated that the earlier tables of Prof. Thomas Gray have been almost entirely rewritten for this fifth edition. Both books claim to be practical and thoroughly up to date; a comparison of them is therefore legitimate and instructive.

(1) Messrs. Kaye and Laby's book of 153 pages is pleasingly got up and very well printed, an enormous amount of material having been carefully dovetailed into a limited space. Heavy type and separation lines are freely used to bring the important features into prominence, thus assisting the eye in finding what is wanted. The work consists of nine sections, entitled —general physics, astronomy, heat, sound, light, electricity, magnetism, radio-activity and gaseous ionisation, chemistry and mathematical tables, together with a good index. One of the most important features, which distinguishes the book from previous compilations, is the fifteen-page section on the constants of radio-activity, a field of work which has grown enormously during the past ten years, and has hitherto been entirely neglected by compilers of tables. This section bears the marks of expert treatment. In the case of most of the important constants the names of the authorities are given throughout the book, with dates and references to original papers. The introductory paragraphs to the tables are many of them especially good, and great discrimination seems to have been shown in the selection of the best determinations for the tables instead of loading them up with matter which only deserves a place in a detailed historical *résumé,* and has long since for practical purposes been relegated to the scrap-heap. The values of the constants given are, so far as we have seen, thoroughly up to date. Thus in the tables of melting points of the elements only ten of the determinations for which the year is given date from earlier than 1900, while sixty-five fall within the present century.

We have submitted the book to a very close examination, and found in it extremely few mistakes. Among these may be mentioned a conspicuous one on p. 47, where, in the thermoelectric tables relating to 10 per cent. platinum-rhodium and platinum-iridium couples, the values of the E.M.F. shown should all be multiplied by 10. On p. 64 the calorific value of illuminating gas is given 1000 times too small, and in the section on electrochemical equivalents on p. 123 the figures for copper and hydrogen require correction to 0·0003295 and 0·00001045 respectively.

The compilation of a book of this kind must have involved immense labour, and every credit is due both to authors and publishers for the result accomplished. We have no hesitation in most cordially commending the work to physicists, chemists, and engineers as by far the best small book of its kind, and likely to prove exceedingly useful. In view of its very moderate price teachers of experimental science would, we think, be well advised in prescribing this volume of constants as a necessary text-book for those attending their courses.

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(2) Turning now to the Smithsonian volume, and having in advance set up a high standard of expectation, we must confess to a feeling of some disappointment on a critical examination. Comparing the present edition with that of 1896, the work of revision does not seem to have been as drastic as might have been expected, and some of the changes appear to the writer to be doubtful improvements. For example, most of the conveniently arranged tables of conversion factors occupying the first twenty-seven pages have disappeared.[1] While not wishing to criticise unfairly so famous and eminently useful a work as these tables have been, we notice throughout a good deal of carelessness in detail, which might easily have been obviated by more critical proof reading. One of the most serious general blemishes is a pronounced tendency continually to misspell proper names, and an extraordinary lack of system seems to have crept in regarding the way of indicating joint authorship of a paper. In about half the instances noticed, the names of the two authors have been hyphened together with, at times, curious results. "Roberts-Austen" we know, but who is Mr. "Baly-Ramsay" or Mr. "Thorpe-Rogers"? With "Thomson-Houston" everyone is acquainted, but we confess to learning with considerable astonishment that specific heat determinations were made by Mr. "Barnes-Regnault." On the other hand, Ayrton and Perry, Heycock and Neville, Perot and Fabry remain "dissociated."

There is a considerable lack of critical faculty in the choice and mode of presentation of some of the data. From a comparison of the gravity tables in Kaye and Laby with this volume the meaning of this criticism will at once be evident.

In the chemical sections of the work the nomenclature is often lacking in system. Thus we find on p. 232 "Nitrogen *tet*roxide NO_2," and on p. 212 "nitric *per*oxide N_2O_4." The hydrocarbon C_6H_6 is spoken of as "benzene," "benzol," and "benzole," and is also probably intended in at least one instance when spelt "benzine." This last name is used, in this country at all events, for a quite different body, which is a mixture of saturated paraffins of low boiling point, variously called benzoline, petroleum-ether, and petrol.[2]

A chemist travelling with his impedimenta, say on the South-Eastern Railway, will be able to ascertain from the table on p. 85 that if he took with him a cubic foot of cæsium, he would have to pay excess luggage, that quantity being stated to weigh 117 lb. The only mention of radium or radio-activity or of the rarer gases of the atmosphere except argon is in the table of atomic weights, and ionisation is only treated in the chemist's and not the physicist's sense of the term.

The table of melting points of inorganic compounds is misleading in that from it one would imagine that many of these substances melted over a range denoted by the limits "max." and "min." rather than at a point, and the column headed "average" value on p. 211 becomes the "probable" value over the leaf.

In table 226 it is twice stated that "1 joule = 1 watt per sec.," and in the appendix some curiously unfamiliar units are mentioned. Few people will be able to define a "metret" or a "barad."

The value of the Wien constant to give a platinum melting point of approximately 1750° C. is not 14,000, but more nearly 14,500, and the table for reduction of platinum thermometer readings mentioned in the title on p. 235 seems to have dropped out.

After mentioning these defects it should, however, be stated that the book has many good points, the mathematical tables comprised in it being in particular a very useful selection.

A considerable list of minor misprints and inaccuracies, too long for insertion here, has been prepared, and is being forwarded to the author.

J. A. HARKER.

PRACTICAL AND THEORETICAL PHYSICS.

(1) *Notes on Practical Physics.* By Dr. A. H. Fison. Pp. viii + 144. (London: Edward Arnold, 1911.) Price 3*s.* 6*d.*

(2) *College Physics.* By Prof. J. O. Reed and Prof. Karl E. Guthe. Pp. xxviii + 622. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1911.) Price 12*s.* net.

(1) THIS little book treats of such an elementary course of practical physics as is usually prescribed for medical students in their preliminary scientific training. As its title suggests, no attempt is made to give an account of the theory of each experiment or even a complete description of how to conduct it, but there is enough to save a demonstrator much wearisome repetition, and allow him to devote himself more to a discussion of each experiment, and to removing the difficulties of individuals. There is no "spoon-feeding," but, on the contrary, attention is directed to the principles involved and to possible difficulties and errors in a way calculated to encourage thought on the part of the student. The book should prove decidedly useful, and, if properly used by teacher and class, should increase the educational value of such a course of practical physics.

For each experiment an important indication is given of its general character as regards accuracy, and the author insists on the importance of considering the degree of accuracy attainable and of seeking that, and paying attention to no more than that, in the various observations and measurements to be made.

Some improvement in details is desirable. The treatment of mirrors should be independent, and not derived from or made analogous to that of lenses. If necessary, space for this could be obtained with advantage by omitting such an experiment as the determination of the earth's horizontal component of force, which could only be treated very partially. There is an occasional pandering to students' weaknesses, as in permitting the use of a chosen length for a simple pendulum in order to save arithmetic, or as in taking 100 c.c. of water in a calorimeter and

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[1] In table 31 of the old edition, "Conversion of quantities of heat," many of the figures given were wrong by 10^6; thus, 1 B.T.U. = 252 grm.-calories—not 0·00025 as stated.

[2] Strictly speaking, these terms are not synonymous, but are applied to different fractions of the same product.

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